Pavement Stabilisation Options in Local Government

29th May, 2019

Scott Young
Technical Manager
BE Hons, RPEng (Civil), RPEQ
Outline

• Introduction
• What is Stabilisation and When Should it be Considered
• Construction
• Why Use Stabilisation
• Basic Design Principles
• Applications
• Q & A
What is Stabilisation?

**Insitu** means ‘in place’

**Stabilisation** is the improvement of a soil or pavement material, through the addition of a small amount of binder.

**Binders** can include:

- Cementitious
- Lime
- Bitumen
- Polymer
- Other
When Should it be Considered?
Construction Process
Construction Process
Specifications

➢ Updates?
➢ Prescriptive
➢ Key Controls
  ➢ Pavement preparation
  ➢ Material inputs
  ➢ Binder(s) application
  ➢ Mix uniformity
  ➢ Depth control
  ➢ Layer thickness
  ➢ Compactive Effort

AustStab
TMR
Local Council
Aus-Spec
Contractor Accreditation
What’s in it for you?

• Cost savings
• Speed of construction
• Engineering process with extensive history (nationally and internationally)
• Environmental benefits
• Reduced need for excavation and importing quarried materials
Why Use Stabilisation?

Rome - circa. 300BC

Stabilisation was used by the Romans over 2,300 years ago, with lime and cement used in various pavement layers.
Why Use Stabilisation?

There are Quarries.....

.....and there are Quarries!
Effect on Network Budget from Ignoring Recycling Strategies

<table>
<thead>
<tr>
<th>Knowledge Base / Risk</th>
<th>Past Experience</th>
<th>Pos</th>
<th>Poor or Limited</th>
<th>Past Experience</th>
<th>Pos</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive</td>
<td>Actual Funds</td>
<td></td>
<td>Required Funds</td>
<td>Actual Funds</td>
<td></td>
</tr>
<tr>
<td>Poor or Limited</td>
<td>Actual Funds</td>
<td></td>
<td>Required Funds</td>
<td>Actual Funds</td>
<td></td>
</tr>
</tbody>
</table>

Past Experience
Basic Design Principals

Structural Design

Mix Design

Thickness
Binder Selection

- Host Material Characteristics
- Rigid/flexible
- Permeability
- Availability
- Cost

<table>
<thead>
<tr>
<th>Binders</th>
<th>Cost per tonne (ex factory)</th>
<th>Typical costs $/m² (250mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GP/GB cement</td>
<td>$230 to $250</td>
<td>$3.65 (3%)</td>
</tr>
<tr>
<td>Hydrated Lime</td>
<td>$250 to $350</td>
<td>$3.95 (3%)</td>
</tr>
<tr>
<td>Quicklime</td>
<td>$200 to $300</td>
<td>$2.40 (3%)</td>
</tr>
<tr>
<td>Bitumen (C170)</td>
<td>$750 to $850</td>
<td>$11.80 (3%)</td>
</tr>
<tr>
<td>Chemicals</td>
<td>$700 to $1,300</td>
<td>$6.35 (1.5%)</td>
</tr>
</tbody>
</table>
Insitu Stabilisation – Applications
Existing Pavement Rehabilitation
Subgrade Stabilisation
Granular Stabilisation
Drying Out Wet Materials
Airfields Construction or Rehabilitation
Scenic Rim Council, Lockyer Valley Regional Council and Southern Downs Council have used Foamed Bitumen on around 50,000m² of unsealed roads in floodways. Since 2014, TMR have completed 151km of Foamed Bitumen treatments, with another 86km currently being constructed or designed.
Unsealed Roads
Material Properties Target

![Diagram showing fines component check with categories A, B, C, D, E, and corresponding descriptions: A - Erodable, B - Corrugates and Ravels, C - Ravels, D - Slippery. The diagram uses a grading coefficient and shrinkage product axes to classify material properties.]
Cassowary Coast Regional Council

- 50% of network is unsealed
- Average rainfall over 3m per year
Silvio Road

- 50 vehicles per day
- Type 2 gravel over sand subgrade
- Corrugations and raveling
- Relatively high maintenance frequency

Ref: CCRC/GHD 2015, Forgotten Best Practices for Unsealed Roads
‘Engineered’ Overlay

- in-situ (sand) 30%
- crusher run (28mm) 45%
- overburden 25%
After Granular Stabilisation
IF YOU DO WHAT YOU’VE ALWAYS DONE,
YOU’LL GET WHAT YOU’VE ALWAYS GOTTEN